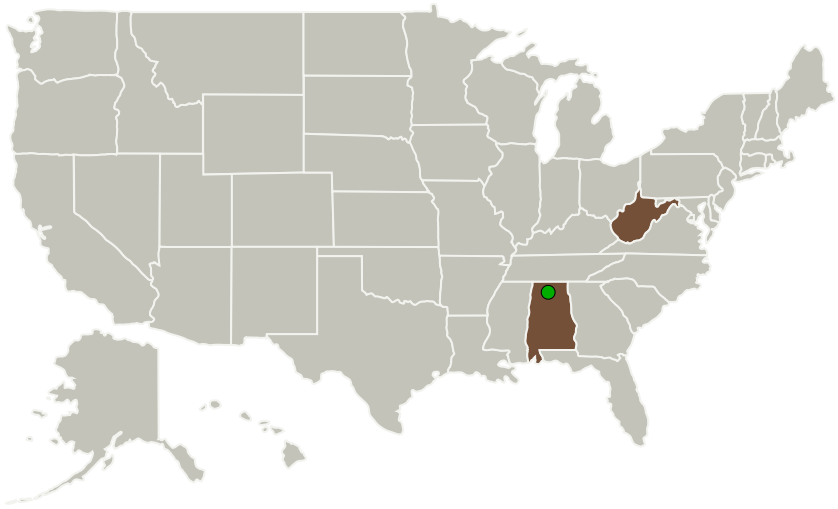
Multifunctional Metal Matrix Composite Filament Wound Tank Liners, Phase II

Completed Technology Project (2011 - 2013)

Project Introduction

Composite Overwrapped Pressure Vessels (COPVs) are used for storing pressurized gases on board spacecraft when mass saving is a key requirement. All future mass critical space applications will be designed to use COPVs to minimize vehicle mass. Saving mass is critical for facilitating deep space travel in which a series of space depots will be implemented as a means of providing fuel along the journey. These depots will require a means for long-term storage of fuel and other resources that can be placed in the appropriate locations ahead of time. Metal Matrix Composite (MMC) materials offer tremendous potential for lightweight propellant and pressurant tankage. Touchstone teamed with Carleton Technologies Inc. (a subsidiary of Cobham) to demonstrate feasibility of this technology in Phase I. A COPV with Al MMC liner was designed and a demonstration liner was produced. The proposed Phase II effort will address key technical risk items identified in Phase I, optimize the liner design and process, and extend the Technology Readiness Level to 5 by completing validation testing on a full-scale COPV demonstration article.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Touchstone Research Laboratory, Ltd.	Lead Organization	Industry	Triadelphia, West Virginia
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	West Virginia

Project Transitions

June 2011: Project Start

December 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139146)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Touchstone Research Laboratory, Ltd.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Brian L Gordon

Co-Investigator:

Brian S Gordon

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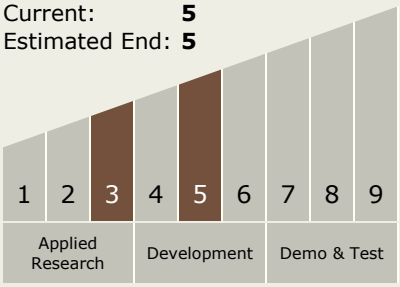
Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.4 Sustainable Manufacturing

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System